**Unit 9 Notes: Organism Form and Function (Maintaining Homeostasis and Responding to Stimuli)**

***Part B: Timing and Coordination***

Ms. Ottolini, AP Biology, 2012-2013

***Directions:*** *Use the links provided on the Wiki page to access each video. Answer the questions below thoroughly and accurately. You do not need to answer in complete sentences, however, please remember that a complete thought often requires a complete sentence! You may need to record your answers on a separate piece of paper.*

**Video #4: Bozeman Biology – Development: Timing and Coordination**

1. Excluding seed germination (which obviously does not happen in humans), what four aspects of human development does Mr. Anderson intend to discuss in this video? (Hint: look at the concept map!)
2. What two things are necessary to induce/activate seed germination (sprouting)?
3. Define cellular differentiation/specialization in your own words.
4. What do scientists call undifferentiated cells?
5. Can the process of differentiation be reversed? Can you take a nerve cell and cause it to become an undifferentiated cell?
6. Describe how a stem cell’s DNA can be manipulated to create a red blood cell, neuron, or skin cell.
7. Mitosis/cleavage of the zygote forms a hollow ball of cells called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Folding in a certain part of this ball results in a structure called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The inner part of this structure becomes the \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of the adult organism.
8. Describe the process of embryonic induction to form the top-bottom body axis. Use the term “transcription factors” in your answer.
9. Explain how the SRY gene (found on the Y chromosome) creates a male embryo. What does Mr. Anderson REALLY mean when he says, “the cell gives off the SRY gene to nearby cells?”
10. How does Mr. Anderson use the example of the blind cavefish to discuss embryonic induction with respect to eye development?
11. Why is apoptosis (cell death) extremely important in human hand development?
12. What are the functions of the hid, grim, and reaper genes in *Drosophila melanogaster* (fruit fly) embryos?
13. What is the function of microRNA? What happens when microRNA molecules are removed from a fruit fly embryo?
14. What role do homeotic genes play in embryonic development?
15. What genetic changes are necessary to produce an ultrabithorax mutant, and how is this mutant fly different from a normal fly?
16. How is an antennaepedia mutant different from a normal fly?

**Video #5: Bozeman Biology – Cellular Specialization**

1. Provide an example of the connection between cells, tissues, and organs.
2. What is the difference between totipotent, pluripotent, and unipotent cells?
3. ***Internal Cues -*** How does the position of cells within the gastrula and germ layers (ectoderm, endoderm, and mesoderm) determine cell type? Use the term “transcription factor” in your response and explain what happens during transcription.
4. ***External Cues -*** What example of external cues (produced by another cell) for cellular specialization does Mr. Anderson provide?
5. ***Environmental Cues -*** How does an increase in temperature and the transport of heat shock factor (a transcription factor) into the nucleus affect the cell?

1. ***Environmental Cues -*** What is another example of an environmental condition that could cause cells to begin producing “shock factors”?

**Video #6: Bozeman Biology – Mechanisms of Timing and Control**

1. What two events does Mr. Anderson intent to discuss that involve timing and control in plants? What about animals and bacteria?
2. Define phototropism in your own words. How is positive phototropism different from negative phototropism? Provide an example of each.
3. How does the plant hormone auxin cause phototropism? Make sure to discuss the mechanisms at the cellular level.
4. Define photoperiodism in your own words. (You may have to look this term up!)
5. How are phytochromes used to regulate photoperiodism?
6. How are the flowering times of poinsettia and arabidopsis plants different?
7. ***Circadian Rhythms -*** When the pineal gland in your brain senses the absence of light (at night), how does it respond?
8. ***Quorum Sensing –*** How are autoinducer proteins involved in quorum sensing?
9. ***Quorum Sensing*** – How can quorum sensing affect bacterial behavior? (Mr. Anderson gives several examples)

**Video #7: Bozeman Biology – Behavior and Natural Selection**

1. What is the difference between innate behavior and learned behavior?
2. What four example behaviors does Mr. Anderson intend to discuss in this video?
3. How is phototropism an example of an adaptive response that is “selected” by the environment? In your response, make sure to refer to the “light war” in a rainforest.
4. How is photoperiodism (response to environmental stimuli which determines flowering time) an example of an adaptive response that is “selected” by the environment?
5. How are courtship rituals like “bower building” among bower birds an example of an adaptive behavior that is “selected” by the environment (specifically by females in the process of sexual selection)?
6. How are cooperative behaviors (ex: pollination) an example of co-evolution?
7. Explain why Darwin’s orchid and moths with extremely long proboscises are considered an example of co-evolution.